

Warming Globe Cools Hopes

Address global warming, climate change scientists warn, or Asia faces malnutrition, barren farms, floods, and devastated agriculture

BY Bronwyn Curran

Four decades from now, Asia could be a hungry region. If projections by climate scientists are correct, Asia will produce half its current wheat yield and 10% less rice. And with current rates of population and economic growth, food demand will double.

Asia is one of the most vulnerable regions to Earth's changing climate, second only to sub-Saharan Africa. Climate scientists are unanimous in predicting that South Asia will be particularly hard hit. Disasters and extreme weather could become common.

"Climate change and more frequent natural disasters threaten to significantly increase hunger and malnutrition," says Michael Sheinkman, senior regional program advisor on vulnerability and analysis mapping for Asia of the United Nation's World Food Programme (WFP).

"More frequent and intense natural disasters; deteriorating environment and land productivity; and reduced access to food, water, and sanitation are projected to increase the risk of hunger and malnutrition worldwide—most affecting countries where hunger, undernutrition, and food insecurity are already widespread."

COLOSSAL CHANGES

Agriculture around Asia faces colossal adjustments to address the threats to food security. The key to survival is food distribution and storage techniques, adapting small farms, and natural disaster preparation, climate scientists say.

Asia's poor are among the most vulnerable because of their dependence on agriculture and their inability to adapt to rising temperatures and extreme weather. About 60% of the region's economically active population and their dependents—2.2 billion people—rely on agriculture for their livelihoods, according to the WFP's 2009 *Climate Change and Hunger* report.

In India, which has the largest number of poor and malnourished children in the world, more than half of

ALL DRIED UP A young man walks across Upper Lake, Asia's largest artificial lake, west of Bhopal, the capital of the Indian state of Madhya Pradesh. Built by Raja Bhoj during his tenure as king of Malwa (1005–1055), the lake once served around 40% of the residents with nearly 30 million gallons per day but now lies completely dried up due to the lack of rain in the past 3 years.

PICTURE CREDIT: AFP







OUT OF GAS A man transports a gas cylinder on his bicycle, guiding it through flood water on the outskirts of Vijayawada, some 300 kilometers southeast of Hyderabad. At least 1.5 million people were displaced in the Indian states of Karnataka, Maharashtra, and Andhra Pradesh after days of torrential rain in October 2009.



the workforce is engaged in agriculture and many more are dependent on it.

Mitigation strategies are clear, and they are urgent. Climate change experts urge Asian governments to convert to clean energy sources, use soil carbon sequestration, harvest water, improve grasslands management, take anti-desertification measures, prepare for natural disasters, pursue reforestation, and undertake emissions trading schemes.

Asian nations are implementing these programs to varying degrees. But few nations have enough strategies in place, at the pace required, to combat the anticipated temperature increase by 2050, says Corey Watts, regional projects

manager of The Climate Institute.

Capacity to adapt to an extra 2°C in the earth's temperature is critical to maintain agricultural production. Hence, the worst-hit will be the region's poor farmers who have little ability in adapting their farming methods to accommodate higher temperatures and more frequent extreme weather events.

"It's not just a question of where climate change will impact, but of people's ability to adapt and respond, and it's the poor who will have the least ability," says Watts. "The kind of rapid climate change we're starting to see now means that our ability to get things together is limited. But adaptation is only one part. If the world warms more than two degrees, then our ability to adapt is very limited. So it's imperative that the world acts to cut emissions at their source."

Currently, about 1 billion of the world's 6.8 billion people are chronically hungry. Climate change threatens to push another 200 million into hunger. As an example, Watts says the prolonged drought in Australia was a major contributor to the 2007–2008 food price hikes and staple shortages,

which led to an extra 200 million hungry people, bringing the global hunger figure to its current 1 billion. As agriculture suffers and hunger spreads, malnutrition is also expected to rise.

While increased agricultural productivity can be seen in northern areas of Asia where some crops stand to benefit from increased carbon dioxide levels in the atmosphere, in South Asia the number of hungry is projected to increase severely because of worsening conditions.

The number of hungry people worldwide is expected to rise 10% to 20% higher than the figure expected without climate change, under scenarios factoring in continued high population growth and regional income disparities. In scenarios anticipating lower population growth and more equitable income distribution, the additional numbers at risk are estimated to be 5% or less.

Decreasing yields threaten food security for more than 1.6 billion people, according to data from the International Food Policy Research Institute (IFPRI) and International Panel on Climate Change's *Fourth Assessment Report 2007*.



WORST DROUGHT IN 50 YEARS

A farmer crosses a dried-up reservoir during a severe drought in Shilin county, Kunming city, Yunnan province in the People's Republic of China. The worst drought in 50 years is leaving millions of people and animals without drinking water. The rainfall in Yunnan since July 2009 has been just over 200 mm, lower than the perennial average and a record low. Other than low rainfall, the province is also experiencing record high temperatures. Average temperatures have been nearly 2 degree Celsius above normal.

SETBACKS IN COMBATING CHILD MALNUTRITION

Climate change will have a "significant negative impact on progress made reducing the proportion of malnourished children, increasing the number by about 11 million in comparison with a no climate change scenario," says the WFP's *Climate Change and Hunger*.

Climate change in Asia is predicted to increase the occurrence of extreme weather events including floods, droughts, forest fires, and tropical cyclones. Asia already accounts for 89% of people affected by disasters worldwide.

"Climate models predict that an increase in global temperature will result in the greater frequency and intensity of storm events. Tropical storms, such as cyclones, typhoons, continue to have large-scale effects on the food security of populations living in Asia," says Sheinkman.

"WFP clearly sees the potential threat to food security posed by high-intensity tropical storms. An increase in the frequency of such storms would have an impact on food security of many countries in Asia including Bangladesh, Myanmar, the Philippines,

Indonesia, East Timor and Viet Nam."

Early warning systems to anticipate natural disasters, plus disaster response preparedness, are key strategies that the WFP urges governments to adopt to mitigate climate change impacts.

The agency is helping the Government of Bangladesh in strengthening its national early warning systems and improving its disaster management system. Since 2000, strategies and activities on disaster risk reduction and climate change adaptation have resulted in 30,000 homes being raised above flood levels, and 1.6 million women trained

in disaster readiness and adaptation.

IFPRI and the International Panel for Climate Change predict that the region's small island-states stand to lose 30%–50% maize crop yield, experience a 10%–35% decline in sugarcane yield, and a 35%–75% decline in taro output as a result of extended dry seasons or significantly increased rainfall.

"Small island-states already have agricultural production under severe stress, making them particularly sensitive to climate change from a food security point of view," the WFP report highlights. "In small island-states with little available land, subsistence food production is vital for food security, rendering impacts of climate change the main reason for loss of livelihoods and increased vulnerability in the region."

IMPACT ON PRODUCTION

Projections are that by 2050 crop production will decline in all regions because of climate change. According to the WFP, Asia will experience up to a 50% decline in wheat and a 17% decline in rice crop yields by 2050 compared with 2000 levels.

"Irrigated and rainfed wheat and irrigated rice are especially hard hit. In the People's Republic of China (PRC), some crops fare reasonably well because higher future temperatures are favorable in locations where current temperatures are at the low end of the optimal temperature for the crop. India and other parts of South Asia are particularly hard hit by climate change," the report states.

The Australian-based Commonwealth Scientific and Research Organization (CSIRO) projects irrigated and rainfed wheat production to fall by more than half in South Asia by 2050. For East Asia and the Pacific, rainfed wheat production is seen to drop by about a third and irrigated wheat by about a fifth. Irrigated rice yields are forecast to fall as much as 23% in South

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Asia, while rainfed rice is seen falling as much as 16%.

By the end of this century, southeast Australia's Murray-Darling Basin food bowl, one of the region's major cereal suppliers, could see its grain yield fall by 90% if climate change is unabated, under CSIRO predictions.

"We're already a land of climate extremes, and we are a food bowl for so much of the world, so the science is pointing to very severe impacts on Australia," says Watts. "Without proper adaptation and mitigation, Australia could go from being a food bowl of the world to being a net importer of wheat by 2050. There will be very severe impacts on Australia and therefore our ability to feed our neighbors in the region."

Food prices are predicted to rise as a result of climate change. The WFP report notes higher price increases in 2050 compared with a no-climate-change scenario. Rice prices would rise 35%–37%; wheat prices, 99%–102%; and maize prices, 58%–62%.

Climate change is also expected to eliminate much of the improvement in combating child malnutrition. In East Asia and the Pacific, about 16.5 million children, instead of just 12 million, would be malnourished in 2050, a 38% increase; while in South Asia, the figure would be 58.1 million instead of 52.3 million, an 11% increase.

While there are variations from community to community in how climate change will impact food production, studies using various models are consistent on the major issues. The WFP's *Climate Change and Hunger* report notes that climate change will reduce agricultural production in most of the world and increase food prices, food insecurity, and malnutrition. Climate change is also expected to put tens to hundreds of millions of people at risk from hunger, roughly a 10%–20% increase. The report predicts that developing countries will be hit harder than

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—René Gomme, senior climate change officer at the Natural Resources Management and Environment Department, Food and Agriculture Organization of the United Nations

developed countries, and the most food-insecure regions, including South Asia, will be hit hardest, though adaptation of farming practices could halve this impact.

"NO-REGRETS" APPROACH

To mitigate the potential impacts of climate change on food security, the Food and Agriculture Organization of the United Nations (FAO) recommends Asian nations reduce greenhouse gas emissions from agriculture through more efficient agropactices such as low tillage, integrated pest management, and using organic fertilizer, and through the substitution of fossil fuels with bioenergy.

Such approaches "represent important opportunities for climate change mitigation," according to FAO's *Impact of Climate Change on Agriculture in Asia and the Pacific 2004* study.

Mitigation activities should follow a "no-regrets" approach, says René Gomme, FAO's senior climate change officer in the Natural Resources Management and Environment Department. "Given the uncertainty about future climate scenarios, no-regrets policies provide a strategy against climate risks and emphasize

measures that should be taken in any case—even in the absence of climate change—because they improve the efficiency of present farming. At the same time, they put farmers in a better position to adapt to or mitigate against climate change, should it occur," Gomme says in an interview.

"Climate policies in Asia must be tailored to risks and country circumstances. Asia's climate is as diverse as its landscape. The region spans a variety of climate zones, including arid deserts, parched rangelands, freezing alpine mountains, and humid tropical islands. The projected impacts of climate change will be heterogeneous, suggesting that there can be no one-size-fits-all approach for building climate resilience across Asia. Responses will need to be customized to specific risks."

Gomme says adaptation strategies should include: promotion of climate-resilient cropping patterns and techniques; agricultural research and extension for promoting climate-resilient crop varieties; improvements in risk management (e.g., climate insurance, contingent credit schemes); and irrigation development and increased investment in water-harvesting infrastructure at required scales that take account of climate risks.

IFPRI points out that higher grain prices will also mean higher meat prices, as feed prices rise. As a result, climate change will reduce the growth in meat consumption slightly and cause a more substantial fall in cereals consumption.

Calorie availability in 2050 will decline relative to 2000 levels throughout the developing world, IFPRI states in its 2009 report on food security. It also predicts that by 2050 the decline in calorie availability will increase child malnutrition by 20% compared to a world with no climate change.

"Climate change will eliminate much of the improvement in child



VULNERABLE TO CLIMATE CHANGE A man rides a bicycle through a flooded street after a heavy storm in Shanghai in July 2009. Asia is one of the most vulnerable regions to Earth's changing climate, second only to sub-Saharan Africa, experts say.



FLOOD IRRIGATION A rice field in Bangalore is submerged in water after strong monsoon rains. India's farmers are dependent on the summer monsoon for irrigation of their plots.

malnourishment levels that would occur with no climate change," it warns.

AGGRESSIVE INVESTMENT STRATEGY

IFPRI advocates "aggressive agricultural productivity investments of \$7.1 billion–\$7.3 billion" to raise calorie consumption enough to offset the negative impacts of climate change on the health and well-being of children.

Watts says carbon sequestration

needs to be a major mitigation strategy. "But it must go hand in hand with cutting emissions at their source. We need to make the switch from dirty sources of energy like fossil fuels to cleaner sources like wind, hydro, biomass, etc."

Watts also urges investment in agricultural development as an urgent mitigation step.

"We need a serious redoubling of investment in agricultural development and productivity. That means at all levels from the best science and extending that research to people on the ground in their communities. We also need to invest in emergency services and risk management so that people have the capacity to respond to extremes of weather."

The PRC has demonstrated a turnaround and is starting to lead the way in clean energy switchover, Watts says. The country is investing in energy efficiency as it dabbles in a clean-tech revolution.

"It is slowly turning that ship around, but it is still very dependent on fossil fuels for its amazing spurt of growth," Watts warns. "We have to decouple economic growth from rising emissions, and it is possible to do that." ■